

Maricopa County
DEPARTMENT OF TRANSPORTATION



BICYCLE
TRANSPORTATION SYSTEM PLAN

ADOPTED MAY 19

1999



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INTRODUCTION ***“Cycle tracks will abound in Utopia.”-H.G. Wells***

Even though never officially adopted, the *1993 Draft Maricopa County Bicycle Plan* provided strong and effective guidance. This plan updates, expands and continues the work of the *Draft Plan* for the next five years. The recently adopted *Comprehensive Plan* and *Transportation System Plan (TSP)* specifically called for updating the County bicycle plan (ref #1). The following quotes highlight commitment to updating the bicycle plan update:

“Update the bicycle facilities plan.”

“Amend the Roadway Design Manual to include bicycle design standards.”

“Complete an Implementation Plan as part of the bicycle plan update.”

This plan works toward implementing these bicycle related recommendations from the *Comprehensive Plan* and *TSP* as adopted by the Board of Supervisors (BOS).

Apart from satisfying implementation requirements, the intent of this plan is to:

- Provide an overview of bicycling conditions in Maricopa County.
- Clearly outline facility, policy and program changes focused on improving and integrating bicycle transportation.
- Strengthen the bicycle program overall while implementing recommendations over the time frame of the plan.

The following document is organized into three major sections: Background, Recommendations, and Implementation. The Background section reviews existing plans, programs, laws and facility conditions. Under Recommendations new goals, objectives, and policies are detailed. Additionally the Recommendations section outlines facility improvements and a recommended bicycle network. The Implementation section sets a realistic guide for improvements “in the right place, at the right time, and at the right cost”.



BACKGROUND

**"I thought of that while riding my bike."
-Albert Einstein, on the theory of relativity**

History

In 1997, the culmination of four years of work were realized with the adoption of the *Maricopa County Comprehensive Plan*, and the *Transportation System Plan (TSP)*. Together these plans provide a blueprint for the growth of Maricopa County over the next twenty years. An important element includes improving travel throughout the County, including bicycle transportation.

Over the past ten years Maricopa County supported improvements for bicycle travel. In 1987 the BOS adopted a policy permitting the use of Highway User Revenue Funds (HURF) for construction of bicycle facilities (ref #2). Derived from gasoline and vehicle license taxes HURF funds provide the main revenue source to plan and build roads. The policy stipulates a clear transportation use for bicycle facilities built with HURF. Bicycle facilities now compete with other road projects as a legitimate transportation need.

In 1989 the BOS approved the development of a Bicycle Program. The program hired a full time Bicycle Coordinator, and created the Bicycle Advisory Committee (BAC). The BAC is one of two appointed citizens committees within the Maricopa County Department of Transportation (MCDOT), along with the Transportation Advisory Board (TAB). The ten member BAC consists of two appointees from each of the five supervisor districts, chosen by Supervisors for their skill and interest in bicycling.

This highly skilled committee has been active in a wide variety of projects over the past nine years. The BAC conducts surveys, prepares teaching resources, reviews provisions for bicycle parking, and provides input for road projects. In 1993 the BAC prepared a draft bicycle facilities plan for Maricopa County. The resulting document defined a network of bicycle corridors, set guidelines for road improvements, and discussed strategies for implementation.

Terms To Look For

BOS	= Board of Supervisors
BAC	= Bicycle Advisory Committee
HURF	= Highway User Revenue Funds
MCDOT	= Maricopa County Department of Transportation
TSP	= Transportation System Plan
MAG	= Maricopa Association of Governments

Figure 1: Terms



Existing Road Network

Actual travel conditions vary throughout Maricopa County. Physical structures like streets, intersections, bike lanes, lane markings, and signs are the "facilities" used to define the overall travel environment. Understanding the status of facilities creates a benchmark by which future conditions and recommendations can be measured.

The County currently boasts an estimated 1000 to 1200 miles of bicycle facilities (lanes, routes, paths, etc...) shown on the following Existing Bicycle Facilities map. The majority of these miles are located within cities and towns, with approximately 100-150 miles found in unincorporated Maricopa County.

Maricopa County Department of Transportation is responsible for 2,829 miles of roadway in unincorporated County areas. Nearly 2,000 of these miles are paved and potential routes for bicyclists. Seventy-five percent of County roads are classified as rural roads. Urban roads make up the remaining twenty-five percent. Roadways classified as rural are streets with shoulders rather than curbs and gutters. Urban streets do have a curb and gutter and are typically located in more developed areas. The County road network remains a rural system, with increasing numbers of urban roads as urban growth expands into the County.

Functional Classification	Miles
Rural Local	1,485
Rural Minor Collector	123
Rural Major Collector	487
Rural Principal Arterial	13
Total Rural	2,108
Urban Local	513
Urban Collector	96
Urban Minor Arterial	86
Urban Principal Arterial	26
Total Urban	721
TOTAL	2,829

Source: RIS database, May 1996

Figure 2: TSP Table

All streets (rural or urban) are classified by their purpose and capacity. *Local* roads are small two lane roads handling neighborhood traffic. *Collectors* are slightly larger streets, designed for more traffic, which connect areas to the main street network. The main street network consists of *Arterial* streets providing movement between major destinations throughout the County. The largest streets (up to six lanes) Arterials are designed to handle the majority of traffic.

Miles of paved road	1,995
Miles of graded road	834
Miles of roadway	2,829
Major bridges	21
Minor bridges	240
River bottom crossings	27
Traffic signals (signalized intersections)	125
Signs and barricades	35,000
Roadway striping miles a year	16,661

Source: MCDOT Annual Report

Figure 3: TSP Table

In many situations County roads are located within a city's boundaries in a County island. County islands are areas or road segments surrounded by one or more municipalities. Such island roadways should not be a gap or barrier to other municipalities extending their bicycle network.

Maricopa County maintains an impressive 2,829 miles of road. Most of these miles are rural streets. Additionally, a majority of these roads are classified as local. Improvements for bicycling are typically focused on collectors and arterials or about 830 miles of the County roadway system.



Existing Off-Road Network

In cooperation with the Maricopa Association of Governments (MAG), MCDOT supports the development of a regional off road bicycle network. MAG has identified an extensive off-road bicycle network (see Fig. 5) for the urbanized parts of Maricopa County. Sections of this network fall within unincorporated County. MCDOT has not developed these unincorporated off-road sections due to HURF funding restrictions.

The majority of existing County off-road facilities are found within the County Park System and serve recreation purposes. MCDOT has typically worked towards providing connections to park areas via on-street facilities. The County park system is detailed below:

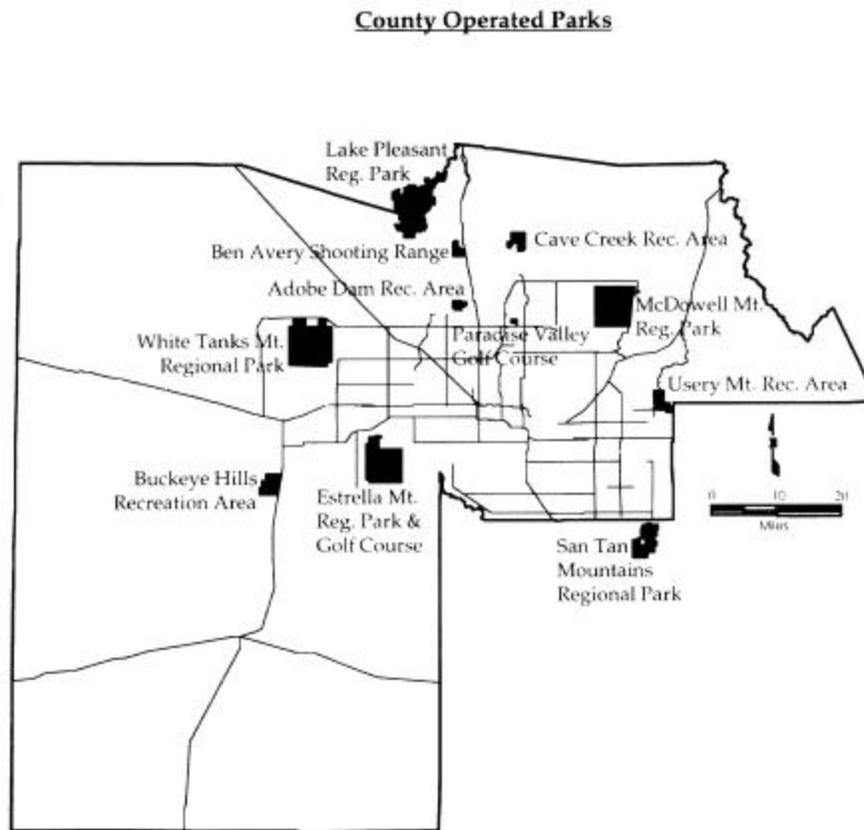


Figure 4: Parks



Existing and Planned Off Road Bicycle System Plan Map (Maricopa Association of Governments)

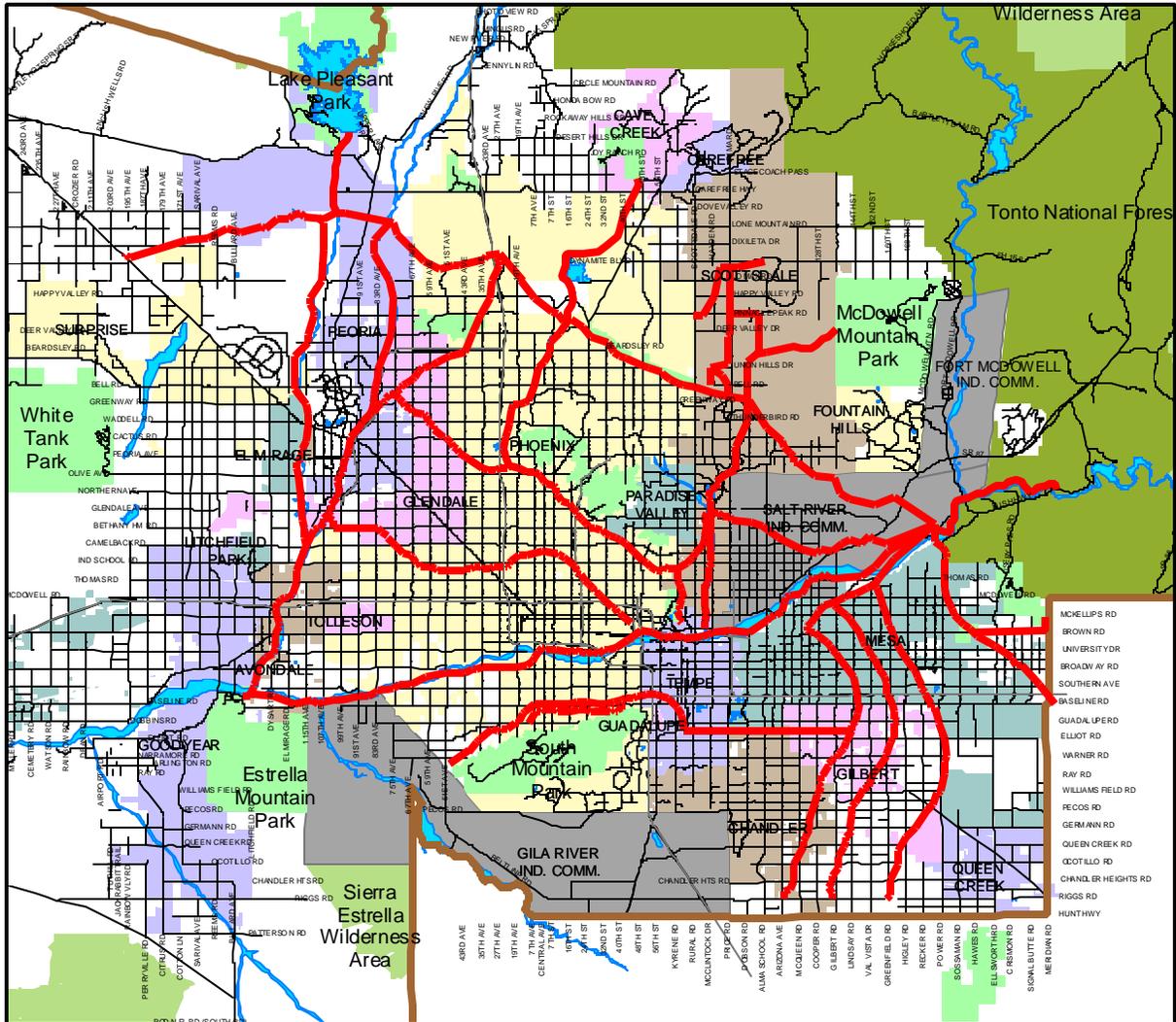


Figure 5: Off-Road Network



Existing Plans, Programs, Policies and Laws

Bicycle travel is affected by a wide range of plans, programs and polices in Maricopa County. This includes transportation plans, land use plans, area studies, corridor studies, BOS adopted policies, and internal programs and initiatives. These elements together provide the structure which supports (or inhibits) the ability to improve conditions for bicycle travel.

Plans

Maricopa County Comprehensive Plan (1997)

Adopted on October 20, 1997, the Comprehensive Plan serves as a guide for land use, transportation, environmental and economic development decisions in unincorporated Maricopa County. Bicycling is closely integrated into the transportation section, as shown in the goal of the transportation element:

"Provide an efficient, cost-effective, integrated, accessible, environmentally sensitive, and safe county-wide system that addresses existing and future roadway networks, as well as promotes transit, bikeways, and pedestrian travel."

The Comprehensive Plan specifically recommends a policy to "explore and encourage options to increase bikeways", in the effort to reduce single occupancy vehicle (SOV) trips. The plan also states that bicycle facilities be included on new roadway construction to "increase opportunities" for the bicycling public. The Comprehensive Plan recognizes bicycling as an important piece of the transportation network.

Transportation System Plan (1997)

Developed concurrently with the Comprehensive Plan the Transportation System Plan (TSP) focuses on creating a transportation network to support the safe and efficient movement of goods and people. The underlying principle of the TSP is evaluating transportation investment by asking the following questions: Is it in the right place? Is it at the right time? Is it at the right cost? Bicycles are included as an integral component in this evaluation process. The TSP recommends three comprehensive improvements for bicycle travel;

1. Change the MCDOT Roadway Design Manual by making roadway cross-sections with bicycle treatments (existing alternative sections) the design standard rather than the alternative.
2. Update the County bicycle facilities plan (this document).
3. Develop an Implementation Plan as part of the update.

These recommendations are intended to further mesh bicycle needs into the overall transportation development process. The TSP implements the transportation elements of the Comprehensive Plan while this project works towards implementing the above bicycle elements for the TSP.



Southwest Valley Transportation Study (1997)

Completed in 1997, this area study was developed to provide a "comprehensive, multi-modal transportation plan" in cooperation with the cities of Avondale, Goodyear, Litchfield Park, Tolleson and the Town of Buckeye. Non-motorized (bicycle and pedestrian) transportation considerations were included as part of this process. This included the following policy as part of the Mobility Improvement goal:

"Provide bikeway facilities on new or reconstructed arterial and collector streets."

The study designates a bikeway system throughout the Southwest Valley consisting of multi-use paths, bike lanes, and signed routes. To implement these improvements the study recommends the inclusion of bicycle facilities into larger roadway projects to minimize cost.

Northeast Valley Area Transportation Study (1996)

Focused on the New River/Desert Hills area, this plan serves as a guideline for development of a multi-modal transportation network. The goal for the non-motorized category states:

"Provide public access that will reasonably accommodate non-motorized travel modes along roadways, including bike routes, equestrian trails and paths and pedestrian walkways to open space within five miles of Northeast Valley residents' homes."

This goal is supported by a policy recommendation which "delineates and protects dedication of bike lanes along major roadways, as per current Maricopa County policy". Additionally the plan recommended the following actions related to bicycling:

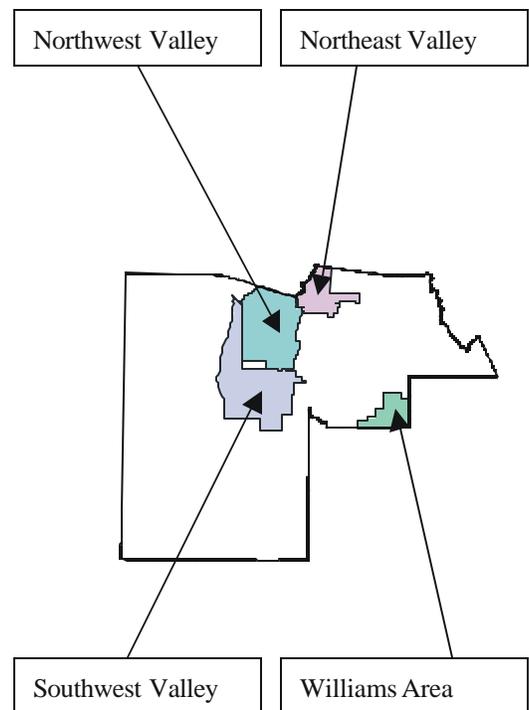


Figure 6: Area Studies

- *Maricopa County Planning Department should encourage all new developments to designate bike and equestrian trails. Maricopa county should also require all new developments to provide bikeway and walkways for school children within elementary school service areas.*
- *Maricopa County Department of Transportation should designate and preserve bike lanes along New River Road, Carefree Highway, and 7th Street.*



Williams Area Transportation Plan (1997)

The Williams Area Transportation Plan covers the unincorporated area of the County south and east of Chandler, Gilbert, Mesa, and including the Town of Queen Creek. This extensive study revolves around the former Williams Air Force Base, which now houses Arizona State University East Campus, Maricopa Community College district, and other educational institutions. The bicycle section of this plan makes the following recommendations:

- *In accordance with the MAG Regional Bicycle Plan, provide bicycle lanes on Power Rd, Williams Field Rd, Guadalupe Rd, Rittenhouse Rd and Lindsay Rd.*
- *Provide bicycle lanes on all arterial streets.*
- *Construct bicycle lanes along major access points to the Williams campus.*

As the educational facilities in the Williams campus area grow the amount of bicycle activity is expected to increase. The recommendations in this plan focus on addressing this future need.

Maricopa County Bicycle Facilities Plan (1993)

Created to specifically address bicycle travel needs, this plan was important for Maricopa County government in accommodating multi-modalism. Intended as a long range, twenty year plan, this plan focused on identifying facilities and the creation of a County bicycle network. This network provided extension of local systems and regional connections. Key objectives from this plan include:

- *Integrate a bicycle element in all County planning.*
- *Establish a review process for the Bicycle Program on all development plans.*
- *Develop a variety of bicycle facilities...*
- *Encourage bicycle education...*

Over 560 miles of bikeways were proposed in the plan. The majority of these miles were designated for bike lanes or as signed routes. Clear definitions of these facility types were included for design guidance. Safety, accessibility, and the overall driving environment were also addressed as elements of this plan. For the past five years this plan has helped integrate bicycle travel needs into the County transportation system.



SUMMARY OF BICYCLE RECOMMENDATIONS IN COUNTY PLANS	
<i>PLAN</i>	<i>RECOMMENDATIONS</i>
Comprehensive Plan	<ul style="list-style-type: none"> • Promote and increase bikeways. • Include multi-modal alternatives. • Include bikes on all new road projects.
Transportation System Plan	<ul style="list-style-type: none"> • Standard bicycle roadway section. • Update bike plan, and implementation.
SW Valley Area Plan	<ul style="list-style-type: none"> • Bikeways on new or reconstructed roads. • Combine with larger roadway projects. • Identifies bicycle network for SW Valley.
NE Valley Area Plan	<ul style="list-style-type: none"> • Provide access to bike routes. • Bike lanes along major roadways. • Designated bikeways in new developments.
Williams Area Plan	<ul style="list-style-type: none"> • Implement existing MAG bicycle plans. • Bicycle lanes on all arterial streets. • Improve bicycle access to campus.
Maricopa County Bicycle Facilities Plan	<ul style="list-style-type: none"> • Integrate bicycling in all County planning. • Bicycle review on all development plans. • Identified facilities. • Encouraged education.

Figure 7: Plan Summary

MAG Regional Bicycle Plan (1992)

Maricopa County participates as a member of MAG and has relied on the MAG Regional Bicycle Plan as a basis for bicycle related efforts on several occasions. This 1992 plan developed a regional network of on road and off road bicycle facilities. The plan recommended over 660 miles of roadway improvements for bicycles, nearly 200 of those miles were in Maricopa County jurisdiction. The goals for this plan fall under four general categories; engineering, education, enforcement and encouragement. The MAG plan relies on member jurisdictions to implement their individual segments connecting and growing the regional system. This plan is currently in the process of being updated.



Bicycle Program

In 1989 the BOS adopted a policy authorizing the creation of a County bicycle program. The program consisted of two main elements: first the creation of a Bicycle Advisory Committee (BAC) and second, the hiring of a full time dedicated bicycle coordinator. The advisory committee is comprised of two citizens from each of the five supervisor districts, appointed by the BOS. The committee was charged with a set of functions and responsibilities, including the following:

- Recommending routes for bicycles as part of a bicycle master plan for the County.
- Review, advise, and determine rules and regulations for the operation of a County bikeway system.
- Assist in the development of public awareness and support for bicycle programs.
- Recommend operating policies for a bikeway system.

These four tasks are part of a larger set of responsibilities, which include County wide coordination, State and National activities, and public interaction. To this end the BAC members have been active in a wide variety of projects over the past eight years. They have conducted surveys, prepared teaching resources, reviewed provisions for bicycle parking, and provided input for road projects. Additionally, the BAC prepared the 1993 draft Bicycle Facilities Plan. This committee meets monthly to review and guide bicycle needs for MCDOT.

As a result of this policy MCDOT hired a bicycle coordinator in 1990, and has maintained this position. The coordinator is in charge of organizing the BAC and fulfilling members' requests. The person in this position represents the County on regional bicycle committees including the Governor's Arizona Bicycle Task Force. The bicycle coordinator also brings forward bicycle projects, and ensures bicycle travel is incorporated into County government operations and policies. The bicycle program is the cornerstone of bicycle transportation for Maricopa County.



Existing Bicycle Design Guidelines

Maricopa County Department of Transportation has a well developed set of bicycle design guidelines. Chapter five of the *Roadway Design Manual* includes roadway cross sections with bicycle facilities (arterial examples shown below). Additionally chapter eight details bicycle facility guidelines (copy of chapter eight included in Appendix C). The existing guidelines in the *Roadway Design Manual* provide substantial direction for how and when to include bicycle facilities in County road projects.

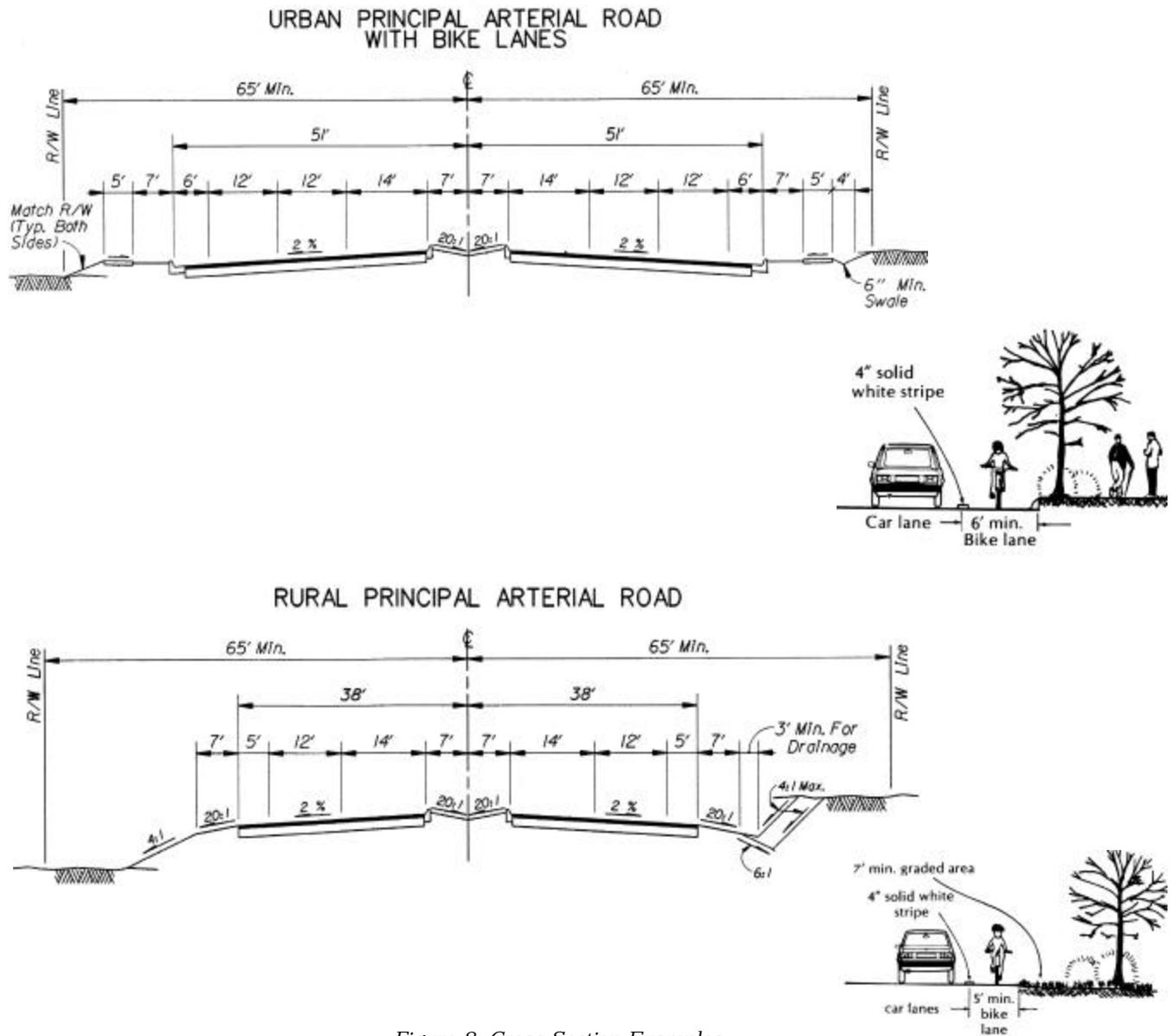


Figure 8: Cross-Section Examples



Existing Laws

A variety of state and local bicycle related laws exist in Arizona. State laws basically provide a legal definition of bicycles, where they are allowed to ride, and the responsibilities of bicyclists. Under Arizona Revised Statutes (ARS) a person riding a bicycle has “all of the rights and is subject to all of the duties applicable to the driver of a vehicle...”. The City of Tempe provides local guidance addressing bicycle riding on sidewalks or bicycle lanes. State laws do not restrict the use of bicycles; in fact the statute provides in detail proper roadway and path use. Three of the main laws covering bicycling are shown below (refer to Appendix D for all State laws pertaining to bicycles):

POINT OF LAW #1

ARS 28-101.

6. "Bicycle" means a device, including a racing wheelchair, that is propelled by human power and on which a person may ride and that has either:
- (a) Two tandem wheels, either of which is more than sixteen inches in diameter.
 - (b) Three wheels in contact with the ground, any of which is more than sixteen inches in diameter.

POINT OF LAW #2

ARS 28-812 .

Applicability of traffic laws to bicycle riders.

A person riding a bicycle on a roadway or on a shoulder adjoining a roadway is granted all of the rights and is subject to all of the duties applicable to the driver of a vehicle by this chapter and chapters 4 and 5 of this title, except special rules in this article and except provisions of this chapter and chapters 4 and 5 of this title that by their nature can have no application.

POINT OF LAW #3

ARS 28-815.

Riding on roadway and bicycle path; bicycle path usage

A. A person riding a bicycle on a roadway at less than the normal speed of traffic at the time and place and under the conditions then existing shall ride as close as practicable to the right-hand curb or edge of the roadway, except under any of the following situations:

1. If overtaking and passing another bicycle or vehicle proceeding in the same direction.
2. If preparing for a left turn at an intersection or into a private road or driveway.
3. If reasonably necessary to avoid conditions, including fixed or moving objects, parked or moving vehicles, bicycles, pedestrians, animals or surface hazards.
4. If the lane in which the person is operating the bicycle is too narrow for a bicycle and a vehicle to travel safely side by side within the lane.

B. Persons riding bicycles on a roadway shall not ride more than two abreast except on paths or parts of roadways set aside for the exclusive use of bicycles.

C. A path or lane that is designated as a bicycle path or lane by state or local authorities is for the exclusive use of bicycles even though other uses are permitted pursuant to subsection D or are otherwise permitted by state or local authorities.

D. A person shall not operate, stop, park or leave standing a vehicle in a path or lane designated as a bicycle path or lane by a state or local authority except in the case of emergency or for crossing the path or lane to gain access to a public or private road or driveway.

E. Subsection D does not prohibit the use of the path or lane by the appropriate local authority.



Bicycle Crash Review

This crash review summarizes six years of crash data 1991-1996. The data reflects only those crashes involving a motor vehicle and reported to law enforcement. Reported crashes are estimated to represent only 10% of all crashes according to national figures. The numbers include all of Maricopa County, incorporated and unincorporated combined.

Estimated number of bicycle related crashes:	10,278	
Total Injuries:	7,040	68.5%
Total possible injuries:	3,144	30.6%
Total fatalities:	90	0.9%
		100.0%

When and where are these accidents occurring?

Thanks to year round riding conditions in Maricopa County, crashes are evenly distributed throughout the seasons. The bulk of crashes occur during the day, although a significant number (21.2%) did take place at night or at dawn. Nearly 85% of the crashes were on a roadway or alley, with the remainder occurring on a bike path or sidewalk (this reflects the reporting system of automobile involvement).

What is happening during the crash?

The data indicates in most situations the bicycle was traveling straight ahead 77% of the time, whereas the automobile was either going straight or making a right turn in 64% of all crashes. 50% of all crashes involved a crossing situation of one form or another between the automobile and bicycle (i.e. right turn, leaving driveway, left turn).

The most frequent crash types for bicyclists compiled from national data include six common situations:

- *The cyclist rides out of a driveway or alley without slowing or looking.*
- *The cyclist enters a signalized intersection even though aware of the law.*
- *A motorist stops at the intersection looking for traffic, then proceeds but fails to see a bicyclist coming from either left or right.*
- *At night on narrow roads a cyclist is riding on the edge and is overtaken by a motorist.*
- *Traveling along the road edge, the cyclist makes an unexpected left turn or swerves and collides with an overtaking motorist.*
- *A motorist at an intersection turning right, without signaling, turns into a cyclist coming from behind.*

Summary

Maricopa County (urban and rural areas combined) experiences about 1700 reported bicycle related crashes per year. The major finding in this review indicates a significant hazard in crossing situations like right and left turns and leaving driveways.



Bicycle Stress Level

The stress level concept for evaluating the bicycle compatibility of roadways provides a framework in which roads can be rated based on their lane width, traffic volume and traffic speed. It was developed by Alex Sorton and the Northwestern University Traffic Institute.

Most bicyclists that ride on the streets attempt to reduce the mental stress induced by motor vehicles. They prefer to avoid conflicts with automobiles and the strain of concentrating for long periods of time while riding along narrow, high speed, high volume roads. The bicycle stress level concept assigns values ranging from 1 to 5 based on traffic variables of curb lane volume, speed and width. Level 1 indicates the variables are not a problem for bicycles while Level 5 indicates there are major problems.

One (very low) ¾ Street is reasonably safe for all types of bicyclists except for children under 10.

Two (low) ¾ Street can accommodate experienced and casual bicyclists, and/or may need altering* or have compensating conditions** to accommodate youth bicyclists.

Three (moderate) ¾ Streets can accommodate experienced bicyclists, and/or may need altering* or contains compensating conditions** to accommodate casual bicyclists. Not recommended for youth bicyclists.

Four (high) ¾ Streets may need altering* and/or have compensating conditions** to accommodate experienced bicyclists. Not recommended for casual or youth bicyclists.

Five (very high) ¾ Streets may not be suitable for bicycle use.

* "Altering" means that streets may be widened to include wide curb lane, paved shoulder addition, etc.

** "Compensating condition" can include street with wide curb lanes, paved shoulders, bike lines, low curb lane volume, etc.

Stress Level Analysis Results

The analysis described above was performed on the 473 mile bicycle network identified in this plan. This provides an idea of the *existing* stress level conditions for these particular road segments. Detail of stress level results for each segment can be found in Appendix A, generalized results are as follows:

Stress Level	Existing Road Conditions
One	0 miles
Two	3 miles
Three	169 miles
Four	235 miles
Five	32 miles
Unanalyzed Miles (limited data)	34 miles
Total Miles	473

Figure 11: Stress Level Results



RECOMMENDED IMPROVEMENTS

“Nothing compares with the simple pleasure of a bike ride.”

-John F. Kennedy

To improve the County transportation network for bicycling the following goals, objectives and policies are recommended for adoption by the Board of Supervisors. Additionally a set of roads identified as the primary County bicycle network is outlined.

Mission Statement

Maricopa County Department of Transportation shall actively enhance, increase and enrich the freedom and opportunities of Maricopa County citizens by integrating bicycle transportation as a standard element in county planning, engineering, design, programs, systems and processes.

Goal 1: Identify a connected bicycle network, which extends and compliments area bicycle plans and systems into and throughout the County.

- a. Create and maintain a database (map) of all cities' bicycle plans.
- b. Combine network recommendations from other County plans.
- c. Create and maintain a database and map of the County bicycle network based on existing County road inventory data.
- d. Integrate county bicycle plans with current and future municipal plans.

Goal 2: Make roadway cross sections with bicycle lanes the roadway design standard.

- a. Revise the MCDOT Roadway Design Manual Chapter 5 *Geometric Design Standards* with bicycle configurations as the standard.
- b. Revise the MCDOT Pavement Marking Manual Chapter 3 *Standard Roadway Cross Sections* with bicycle configurations as the standard.
- c. Develop alternative striping configurations based on the minimum widths detailed in Table 5.1: Lane Widths, of the Design Manual.
- d. Implement a re-striping program to include bicycle lanes when/where feasible.



Goal 3: Develop an Implementation Plan outlining specific steps, timelines, and processes towards complete implementation of this plan.

- a. Prioritize bicycle projects in cooperation with the Capital Improvement Program (CIP).

Goal 4: Encourage and support existing bicycle safety and education programs operating in Maricopa County.

- a. Utilize the County Bicycle Advisory Committee to develop safety and education products.
- b. Participate with other organizations on safety and education efforts.

Goal 5: Integrate bicycle transportation needs into ongoing and future transportation, land use, and economic development plans.

- a. Require the following review processes to include bicycle transportation needs as defined in this plan:

Transportation

- Small Area Transportation Studies
- Design Concept Reports
- Candidate Assessment Reports
- Corridor Studies
- Expand the participation of the Bicycle Coordinator in project scope development, project review and design review.
- Utilize the BAC in a review capacity for all projects including bicycle facilities.

Land Use and Economic Development

- Comprehensive Plan
- Master Plan Developments
- Standard New Development
- Small Area Plans



Policies

Policy 1: General Bicycle Policy

- a. Maricopa County recognizes bicycling as a viable transportation mode, and actively works toward consistently and prudently improving the transportation network to increase access, safety and equity to the transportation system.

Policy 2: Facility Commitment Policies

- a. Maricopa County Department of Transportation shall include bicycle facilities on all County roadways as described in the Roadway Design Manual and the Pavement Marking Manual.
- b. Bicycle projects not directly combined with a larger roadway project shall be evaluated separately during the CIP process.
- c. The Capital Improvement Program shall rate projects with bicycle elements higher than projects without bicycle elements.

Policy 3: Organizational Change Policies

- a. MCDOT shall institute a multi-modal review process during planning and design of projects as well as during review of subdivision and development proposals to ensure proper inclusion of bicycle, pedestrian and transit needs.
- b. Partners, consulting engineers, contractors and customers of Maricopa County Department of Transportation are to be informed of the position of the County towards bicycle transportation and encouraged to follow the same standards and principles when working with the County.



Facility Recommendations

The Maricopa County Bicycle Transportation Plan includes the addition of 473 miles of on-road bicycle facilities. There are 588 road segments from the County road database that have been combined and condensed to 110 segments for the purposes of this plan.

One of the plan's goals is to provide bicycle links between all the communities in Maricopa County. The inclusion of Old US80 connects Gila Bend and Arlington with Buckeye and the Phoenix Metropolitan area. Wickenburg was connected from the south by including Vulture Mine and Wickenburg Roads. Salome Highway is another rural route that provides a connection with La Paz County.

Another goal is to provide bicycle links between cities in the Phoenix Metro area. There are many county islands in and on the edges of the valley cities that make it difficult for the cities to provide continuous, uninterrupted routes. Many of the segments in this plan line up with existing or planned bicycle facilities in various cities. Providing continuous travel routes along collector and arterial streets will facilitate the choice of the bicycle as an alternate mode of transportation.

Recommended Bicycle Network

The map on the following page shows the entire recommended bicycle network. The 110 network segments are grouped into various geographic regions. Each segment includes a description, and purpose for being included in the bicycle network (see appendix A). This network reflects a backbone for bicycle facilities to prioritize investment, and guide project development. A detailed listing of segment data can be found in Appendix A.

Appendix A provides an initial framework for a Bicycle Improvement Program (BIP). The BIP will be updated annually in conjunction with the Capital Improvement Program (CIP). The BIP tracks bicycle projects, prioritizes bicycle needs, and identifies required resources.

The recommended bicycle network and Bicycle Improvement Program are intended as reference points and initial starting points. Projects not specifically found on the bicycle network or in the BIP should not discount the inclusion of bicycle facilities. The ultimate bicycle network for Maricopa County includes all streets functioning as an arterial or lesser classification.



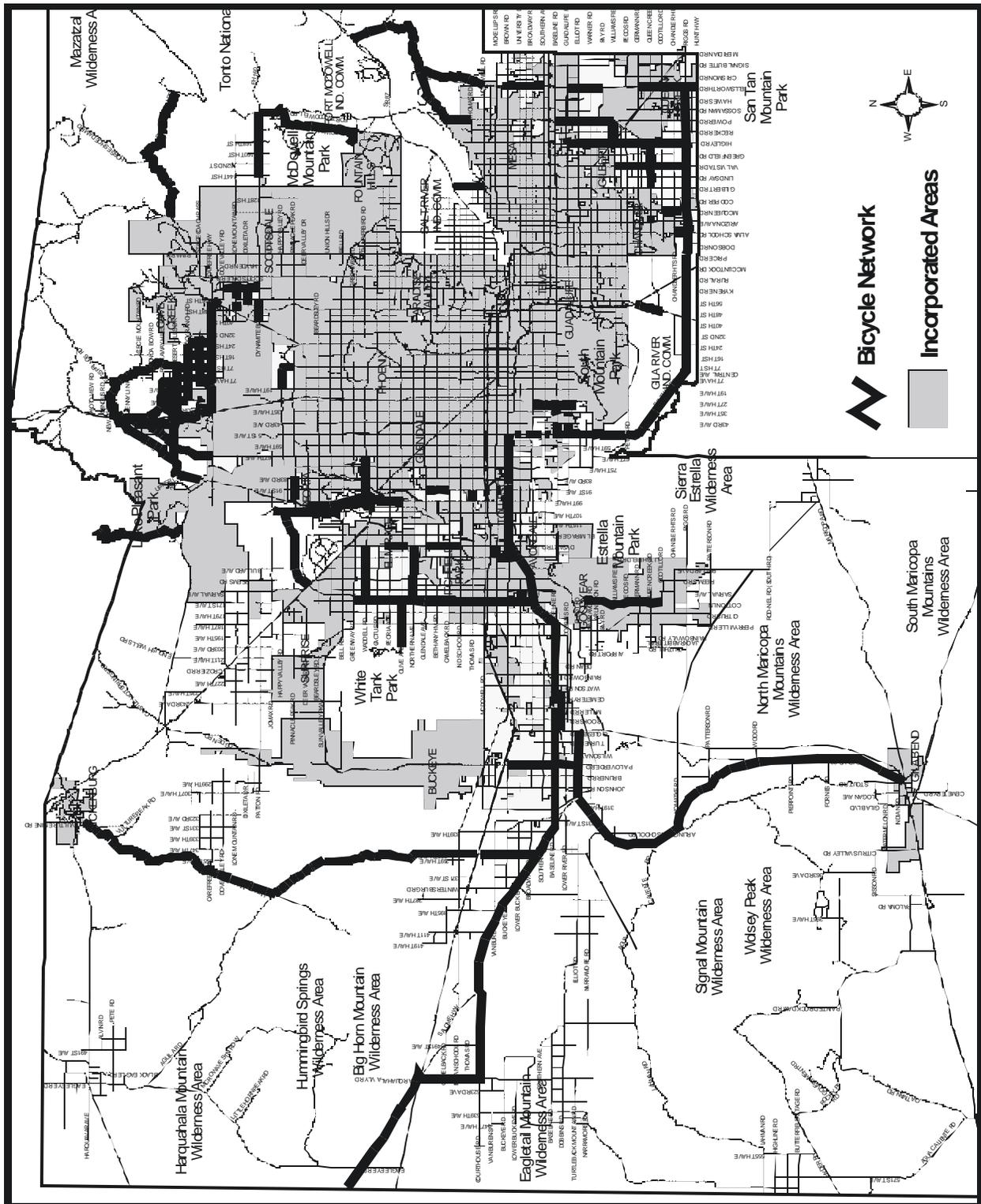


Figure 12: County Bicycle Network



Benefit / Cost of Additional Shoulder Pavement Width

Introduction

Building streets for more than automobiles requires a commitment and understanding that streets are a community resource not simply a car conduit. Maricopa County Department of Transportation (MCDOT) understands the benefits of building a better street, by developing excellent standards and guidelines inclusive of bicycling, pedestrians and transit. The benefits of these roadway standards and the added cost of providing them are important to review and understand. This section will detail what these standards are, the cost of providing them, challenges for building streets for modes other than the car and finally the benefits, both in hard dollar savings and quality of life improvements.

Current Design Standards

MCDOT builds two basic types of roadways, rural and urban. Urban roads have curbs and gutters at the edge of the roadway and are located in densely populated areas. Rural roads have no curb or gutter and are built in outlying areas of the County. Within the last few years MCDOT committed to building (or reconstructing) through attrition all rural roads with five foot paved shoulders primarily for safety reasons. Additional benefits realized include the provision of an area for bicyclist to ride without being in main traffic lanes. MCDOT currently has two cross-sections for urban collectors and arterials, one with and one without a four foot bicycle lane. The focus of this section will be on the 112 miles of arterials in the County road network, and the need for providing a wide paved shoulder/bicycle lane on these cross sections, see appendix B for exact details.

COST

The cost of building urban arterials with additional shoulder width is 4-6% higher than building the same roadway without the additional width. This translates into a range of \$90,000-\$160,000 more per mile depending on the roadway classification (minor or major). Estimates from MCDOT operations indicate an increase of \$350 dollars per year/per mile of road for maintenance with this additional pavement width. Figuring a 20 year roadway lifetime, the potential cost of building one mile of road with bicycle lanes can be estimated between \$91,890 and \$164,164.

Road Type	Construction Cost w/o bikelane/mi	Construction Cost w/ bikelane /mi	Difference Per mile (increase in construction cost)	% Increase	Operations Increase per Mile, Over 20 yr Lifetime	Total 20 yr Cost/mile w/ bikelane
Urban Major Arterial	\$2,621,630	\$2,778,794	\$157,164	5.9%	\$7,000 (\$350/mile/yr)	\$164,164/mile
Urban Minor Arterial	\$2,146,565	\$2,231,455	\$84,890	3.9%	\$7,000 (\$350/mile/yr)	\$91,890/mile



		Total Potential Investment
Total Miles of Arterials	112	
Additional Capital Cost Per Mile (high cost)	\$160,000	112 x \$160,000 = \$17,920,000
Additional Operating Cost Per Mile/Per Year	\$350	(112 x \$350) x 20yrs = \$784,000
Total Potential Investment (20 year lifetime)		\$18,704,000

Challenges

One of the major benefits for building roadways with wide paved shoulders is the ability to add a bicycle lane to the street. Concern has been expressed over the expenditure of Highway User Revenue Funds (HURF) for bicycle transportation. The Arizona State Constitution and Arizona State Statutes say nothing preventing the use of HURF for constructing or maintaining on-street bicycle facilities (on-street facilities are the only recommended improvements in this plan).

In fact, HURF is only restricted in terms of use for building and maintaining roads and streets. The state constitution says nothing about intended mode of use (see Article IX, Section 14 of AZ State Constitution). Furthermore, bicycles by State Statute are given the same rights and responsibilities of automobiles when operating on roads. (see Title 28 Chapter 3 Article 11 of the Arizona State Statute, attached). The Board of Supervisors recognized these facts in 1987 and issued a Board Policy indicating the allowed use of HURF for bicycle facilities (see Board Policy 61-88, attached).

Another misconception is that bicycle facilities are for recreation not transportation. Part of this misunderstanding stems from the rural nature of the County road system. Bicycle trips on outlying rural roads are less likely work trips and more likely for exercise or touring. The focus of this plan is not on the outlying rural areas. The urban and near urban areas are the highest priority areas to improve for bicycling.

An underlying principle behind the development of this plan is to extend, connect, and enhance the bicycle networks and plans of the incorporated areas. In urban areas, 1% of all trips are made by bicycle. The 112 miles of urban arterials in the County road network are the focus of these discussions and the focus of investment for bicycle facilities. Additionally any trip made by a bicyclist (no matter the purpose) is one less trip otherwise made in an automobile.

Bicycles are granted the same rights and responsibilities as people who choose to use automobiles on the roads. There is no constitutional conflict preventing the construction of on-street bicycle facilities. Bicycle facilities (especially on the urban roadways) are designed and intended to provide transportation and increased mobility, and not as recreation facilities. In the United States these misconceptions are prevalent in most transportation



agencies, to varying degrees. Understanding them is the first step to overcoming these obstacles to improving our transportation environment.

Benefits

Benefits realized from building streets with wide paved shoulders/bicycle lanes include: accident reduction, lower automobile Vehicle Miles Traveled (VMT), air quality improvements and enhanced quality of life. The following conservative estimations of the benefits clearly show initial investment and increased operating cost are outweighed by advantages to the public.

Accident Reduction

According to the American Association of State Highway and Transportation Officials (AASHTO) roadways with paved shoulders have lower accident rates for the following reasons:

Paved shoulders...

- Provide space to make evasive maneuvers;
- Accommodate driver error;
- Add a recovery area to regain control of a vehicle, as well as lateral clearance to roadside objects such as guardrail, signs and poles (highways require a "clear zone," and paved shoulders give the best recoverable surface);
- Provide space for disabled vehicles to stop or drive slowly;
- Provide increased sight distance for through vehicles and for vehicles entering the roadway (rural: in cut sections or brushy areas; urban: in areas with many sight obstructions);
- Contribute to driving ease and reduced driver strain;
- Reduce passing conflicts between motor vehicles and bicyclists and pedestrians;
- Make the crossing pedestrian more visible to motorists; and
- Provide for storm water discharge farther from the travel lanes, reducing hydroplaning, splash and spray to following vehicles, pedestrians and bicyclists.

According to the most recent (1995-1997) accident data collected by the Arizona Department of Transportation, Maricopa County experiences about 3,300 accidents on average per year on County roads. Around 1300 per year of these are injury accidents, with about 45 fatal accidents per year. The remainder report either no injury, unknown, or simply not indicated.

Maricopa County could reduce the number of injury and fatal crashes by at least 5%, (conservatively speaking), by building roadways with wide paved shoulders/bicycle lanes. This is supported by the Federal Highway Administration which found in *The National Bicycling and Walking Study* a 29% reduction in various accident types with the installation of paved shoulders. Other investments in roadway safety improvements have also been shown to reduce accidents. An evaluation by the United States Department of Transportation (U.S. DOT) has shown the following benefits:

Construction of medians	= 73% reduction
Realigning roadways, removing roadside obstacles	= 66% reduction
Constructing turn lanes and traffic channelization	= 47% reduction
Improvement in signing	= 39% reduction

The U.S. DOT calculates the societal cost of each traffic fatality at \$881,000 and the cost of non-fatal injury crashes at \$16,000 per accident. Assuming a



conservative 5% reduction in accidents by building roadways with wide paved shoulders the following benefits are realized for Maricopa County:

Accident Types	Total for County/yr	5% reduction	Cost of Accident	Savings/yr
Injury	1300	65	\$16,000	65 x \$16,000 = \$1,040,000
Fatal	45	2.25	\$881,000	2.25 x \$881,000 = \$1,982,250
Total Savings/year				= \$3,022,250
20 yr Lifetime Savings				= \$60,445,000

The study conducted by the U.S. DOT clearly shows significant reductions by investing in safety improvements to roadways. The 5% reduction in crashes for building roads with wide paved shoulders/bicycle lanes could clearly be much higher considering the trends found by these other safety improvements. Improving safety is one of the most cost effective investments for roadways, considering the high societal cost of these crashes.

Lower Vehicle Miles Traveled

National and regional figures show that bicycling accounts for 1% of all trips. Providing bicycle facilities is the primary method used to shift trips made via automobiles to trips made by bicycles. By building roadways (particularly in and near urban areas) with bicycle facilities it is reasonable to consider a certain number of trips will shift to bicycles. For the purposes of this section a conservative estimate of .5% mode shift will be considered.

Estimations of Vehicle Miles Traveled (VMT) on the 112 miles of County arterials from County and MAG data indicate 850,000 miles traveled per day. Based on these figures the following savings can be realized if .5% of this travel is shifted to bicycles.

Total VMT/day	.5% shift to bicycles/day	Yearly VMT Saved	Cost/mile*	Overall Yearly Savings	20 year lifetime savings
850,000 mi	4250 mi	4250 mi x 260 work days = 1,105,000 miles	\$0.44	1,105,000 miles x \$0.44 = \$486,200	\$486,200 x 20 yrs = \$9,724,000

*FHWA 1997 Cost of Owning and Operating an Automobile

Lowering vehicle miles traveled provides a substantial citizen savings. In addition to the saving from operating costs are pollution reductions. For every 1% of automobile trips replaced by bicycling an estimated 2% to 4% reduction in air pollution is realized (Todd Litman, Victoria Transport Policy Institute.)

Creating a multi-modal system is a cornerstone of the County's long range vision. Shifting trips from cars to bicycles in one of the elements used to realize this vision. The goal of the transportation element in the Comprehensive Plan reads as follows...



*Provide an efficient, cost-effective, integrated, accessible, environmentally sensitive, and safe county-wide **multi-modal** system that addresses existing and future roadway networks, as well as promotes transit, bikeways, and pedestrian travel.*

Shifting trips from automobiles to bicycles by building facilities (bicycle lanes) is a cost effective investment. Wide shoulders/bicycle lanes provide savings in lower VMT and lower pollution along with promoting multi-modal transportation benefiting all tax payers.

Quality of Life

AASHTO details the following benefits of wide shoulders. These benefits apply to rural shoulders and on-street bike lanes in urban areas (as prepared by Michael Ronkin, for the Oregon Department of Transportation):

Capacity - highways with paved shoulders can carry more traffic, as paved shoulders:

- Provide more intersection and safe stopping sight distance;
- Allow for easier exiting from travel lanes to side streets and roads (also a safety benefit);
- Provide greater effective turning radius for trucks;
- Provide space for off-tracking of truck's rear wheels in curved sections;
- Provide space for disabled vehicles, mail delivery and bus stops; and
- Provide space for bicyclists to ride at their own pace;

Maintenance - highways with paved shoulders are easier to maintain, as paved shoulders:

- Provide structural support to the pavement;
- Discharge water further from the travel lanes, reducing the undermining of the base and sub-grade;
- Provide space for maintenance operations;
- Provide space for portable maintenance signs;
- Facilitate painting of edge stripes.

In urban areas, bike lanes offer additional benefits to road users other than bicyclist.

For Pedestrians:

- Greater separation from traffic, especially in the absence of on-street parking or a planter strip, increasing comfort and safety. This is important to young children walking, playing or riding their bikes on curbside sidewalks.
- Reduced splash from vehicles passing through puddles (a total elimination of splash where puddles are completely contained within the bike lane).
- An area for people in wheelchairs to walk where there are no sidewalks, or where sidewalks are in poor repair or do not meet ADA standards.
- A space for wheelchair users to turn on and off curb cut ramps away from moving traffic.
- The opportunity to use tighter corner radii, which reduces intersection crossing distance and tends to slow turning vehicles.



- In dry climates, a reduction in dust raised by passing vehicles, as they drive further from unpaved surfaces (benefits our PM-10 efforts.)

For Motorists:

- Greater ease and more opportunities to exit from driveways (thanks to improved sight distance).
- Greater effective turning radius at corners and driveways, allowing large vehicles to turn into side streets without off-tracking onto curb.
- A buffer for parked cars, making it easier for motorists to park, enter and exit vehicles safely and efficiently. This requires a wide enough bike lane so bicyclists aren't "doored."
- Less wear and tear of the pavement, if bike lanes are re-striped by moving travel lanes (heavier motor vehicles no longer travel in the same well-worn ruts).

For Other Modes:

- Transit: A place to pull over next to the curb out of the traffic stream.
- Delivery vehicles (including postal service): a place to stop out of the traffic stream.
- Emergency vehicles: Room to maneuver around stopped traffic, decreasing response time.
- Bicyclists: Greater acceptance of people bicycling on the road, as motorists are reminded that they are not the only roadway users;
- Non-motorized modes: An increase in use, by increasing comfort to both pedestrians and bicyclists (this could leave more space for motorists driving and parking).

For the Community (Livability factors):

- A traffic calming effect when bike lanes are striped by narrowing travel lanes.
- Better definition of travel lanes where road is wide (lessens the "sea of asphalt" look).
- An improved buffer to trees, allowing greater plantings of green canopies, which also has a traffic calming effect.

Summary

Providing roadways with wide paved shoulders/bicycle lanes costs typically 4-6% more than roads without shoulders. The benefits described outweigh this increase as shown below:

Total potential cost (20yr, high cost, including annual operating increase)	= \$18,704,000
Savings from accident reduction (5% reduction, 20 year savings)	= \$60,445,000
Savings from lower VMT (.5% mode shift to bicycles, 20 year savings)	= <u>\$ 9,724,000</u>
Total Savings	= \$70,169,000
Benefit Cost ratio = \$70,169,000/\$18,704,000= 3.75	

In addition to these dollar savings, there is a wide range of qualitative improvements realized from building streets with wide paved shoulders/bicycle lanes. They improve safety, capacity, maintenance, pedestrian environment, motorist environment and the use of the street by a variety of modes.



Bicycle Parking

The following section provides minimum standards for the development of bicycle parking on private property within Maricopa County. These standards are recommended to establish effective and attractive means for providing a minimum area for parking and storage of bicycles. These standards in part support the County Trip Reduction Ordinance.

Rules

Bicycle rack design shall:

- Support the frame of the bicycle, allowing at least one wheel and the frame to be locked to the rack.
- Allow the option of using a U-lock or cable with padlock.
- Allow two bikes to be locked with one lock.
- Be easy to understand and use without instruction.
- Be anchored securely.

Bicycle rack shall be located:

- Along natural surveillance near main entrances.
- Where easy access is provided.
- With area around the rack for access, per design specifications.
- In well-light areas at night and well-shaded areas during the day.
- On flat surfaces out of the path of pedestrian and automobile traffic.
- Near walkways to building entrance.
- No greater distance than the nearest automobile parking space.

Use Standards

Performance Standard: To provide a minimum number of bicycle parking spaces that would meet the typical needs of most uses.

Parking Space Standards

Performance Standard: To provide an adequate area to park the bicycle.

Bicycle Space:

Bicycle rack installations shall allow 18 inches minimum between two bicycles, and 24 inches between pairs.

Bicycle rack shall allow a minimum of two feet between abutting walls, fences, posts, or other objects, and the rack mechanism.

Surface Standards

Performance Standard: To provide a dust-free, well drained area for bicycle storage.

Bicycle Space Surface:

Bicycle space surface shall be paved in asphalt, concrete, or one inch of acceptable aggregate material.



Residential Uses

Mobile Home and Travel Trailer/RV Park	2 bicycle parking spaces per 20 auto parking spaces to meet the needs of any commercial, office or public assembly
Single-family (includes mobile homes on owned lots)	NONE
Multiple-Family	2 bicycle parking spaces per 20 auto parking spaces to meet the needs of any commercial, office or public assembly.
Fraternities & Sororities	1 bicycle parking space per room

Public Assembly Uses

Schools, Elementary and Junior High	1 bicycle space per 10 students
All other public assembly uses	4 bicycle parking spaces per 20 auto parking spaces
Hotels, Motels, Guest Ranches and Resort Hotels	2 bicycle parking spaces per 20 auto parking spaces
Office and Commercial Uses	2 bicycle parking spaces per 20 auto parking spaces
Industrial, Wholesale and Manufacturing Uses	2 bicycle parking spaces per 20 auto parking spaces

ALSO

One additional bicycle parking space shall be required if the number of required bicycle parking spaces results in a fractional number.

In regards to mixed use development, the required bicycle parking spaces shall be the sum of the required parking spaces for the individual uses.

In regards to Special Use Permits, bicycle parking requirements are already subject to discretion by the Planning and Zoning Commission and the Board of Supervisors.



IMPLEMENTATION

"Life is like riding a bicycle. You don't fall off unless you plan to stop pedaling."

CLAUDE PEPPER

Maricopa County committed to accommodating bicycles. Over ten years ago the Board of Supervisors created a bicycle program, hired a bicycle coordinator and appointed a citizens advisory committee focused on improving the bicycle environment in Maricopa County. The success of this foresight is evident today. A review of recent County plans and programs reveals a consistent inclusion of bicycle needs. Funding for bicycle facilities has been made possible through policy resolution and a comprehensive bicycle plan was developed and well utilized.

This plan continues, improves and strengthens this ongoing effort. Outlined earlier are recommendations aimed at making improvements. Implementing these recommendations in a timely, cohesive and ordered manner remains the largest challenge.

Timeline & Success

First drafted in 1993 the bicycle plan is scheduled for major updates every few years. This plan will be updated according to the following schedule:

Completed	Current Update	Future Updates
1993	1998	2002/2006/2010

Benchmarks

Measuring implementation provides meaningful feedback showing the plan's success. The following benchmarks lay out a guide to reflect work progress:

- Double the miles of bike lanes on County roadways by 2002.
- Make all recommended changes and reissue the *Roadway Design Manual* and *Pavement Marking Manual* within 6 months of plan adoption.
- Develop and institute a multi-modal review process within 6 months of plan adoption.
- Update on a yearly basis, in conjunction with the CIP, the Bicycle Improvement Program (BIP) as first presented in this plan.
- Establish a dedicated funding mechanism for bicycle improvements within 3 years of plan adoption.
- Implement the bicycle parking ordinance within 1 year of plan adoption.
- Fully align all CIP projects with policies adopted in this plan within 1 year of plan adoption.
- Conduct or take part in a comprehensive transportation survey which includes bicycle elements within 2 years of plan adoption.
- Host a bicycle planning workshop for MCDOT engineers within 6 months of plan adoption.
- Conduct a comprehensive analysis of pavement, lane and shoulder widths on the County road network within 5 years of plan adoption.



Funding

Funding for bicycle transportation improvements should be integrated into the overall Capital Improvement Program. Bicycle facilities constructed as part of larger projects are typically less expensive than independent bicycle projects. In many cases, however bicycle improvements are needed along roadways not scheduled for reconstruction. Dedicated funding sources should be created to fund a yearly Bicycle Improvement Program (BIP) within the MCDOT funding structure. Additionally, many types of Federal funding are also available for bicycle facilities, as described below.

Transportation Equity Act for the 21st Century - TEA 21

TEA 21 reauthorizes the federal highway, transit, safety, research and motor carrier programs for the six-year period 1998-2003. It commits to spending \$215 billion on transportation programs over the six-year period 1998-2003. TEA 21 is a continuation of the Intermodal Transportation Efficiency Act of 1991 (ISTEA) which represented significant opportunities for improved state and local bicycle and pedestrian programs. Each state is required to develop transportation plans and programs that provide for inclusion of pedestrian walkways and bicycle transportation facilities as part of their Intermodal State transportation system. Each metropolitan planning organization is required to develop transportation plans that include pedestrians and bicyclists as users within an intermodal system. When highway bridges are being replaced or rehabilitated with Federal funds on a highway where bicycles are permitted, then the bridge must provide accommodation for bicycles, if costs appear reasonable. Funding is available through the following TEA 21 programs:

National Highway System (NHS) Funds

These funds can be used to construct bicycle and pedestrian facilities on land adjacent to any highway in the National Highway System (other than the Interstate System). The facilities must be primarily for transportation uses and must be located and designed in accordance with a plan developed by the State and MPO.

Surface Transportation Program (STP) Funds

These funds can be used for both bicycle transportation facilities and pedestrian walkways and for projects such as route maps, brochures and public service announcements. These projects must be transportation-oriented and tied to a plan adopted by State and MPO. A percentage of each state's annual STP funds is available only for Transportation Enhancement Activities (TEAS). Ten types of TEAs are defined including: "provision of facilities for bicyclists and pedestrians" and "preservation of abandoned railway corridors, including the use thereof for pedestrian and bicycle trails."

Congestion Mitigation and Air Quality Improvement (CMAQ) Program Funds

These funds may be used for either construction on bicycle transportation facilities and pedestrian walkways or for nonconstruction projects related to



safe bicycle use (maps, brochures, etc.). The projects must be transportation-oriented and tied to a plan adopted by State and MPO.

Federal Lands Highway Funds

These may be used to build bicycle transportation facilities and pedestrian walkways in conjunction with roads, highways and parkways at the discretion of the department charged with administration of these funds. The projects must be transportation-oriented and tied to a plan adopted by State and MPO.

Scenic Byways Program Funds

These funds can be used to construct facilities along highways for pedestrians and bicyclists.

Highway Safety Funds

Bicycle and pedestrian safety remain priority areas for highway safety program funding. The Governor's Office of Highway Safety administers funding for safety related programs in Arizona. Grants are in the form of reimbursable contracts and are made on the basis on a 10% local match.

Federal Transit Funding

Transit funds may be used to provide bicycle and pedestrian access to transit facilities, to provide bicycle parking and shelter facilities and to install racks or other equipment for transporting bicycles on transit vehicles.



GLOSSARY

AASHTO ^¾	American Association of State Highway and Transportation Officials.
ADOT ^¾	Arizona Department of Transportation.
ADT ^¾	Average Daily Traffic volume
APA ^¾	American Planning Association
ARS ^¾	Arizona Revised Statutes.
Bicycle ^¾	Every device, including a racing wheelchair, that is propelled by human power and on which a person may ride and that has either: (a) Two tandem wheels either of which is more than sixteen inches in diameter. (b) Three wheels in contact with the ground any of which is more than sixteen inches in diameter (ARS 28-101.6).
Bicycle Facilities —	A general term denoting improvements and/or provisions made by public agencies to accommodate or encourage bicycling, including all bikeways, shared roadways whether or not specifically so designated, parking facilities, signing and mapping.
Bicycle Lane ^¾	A portion of roadway striped, with pavement markings and signed for exclusive use of bicycles. These must meet certain standards for width, striping, signing and marking.
Bicycle Path ^¾	See “Shared Use Path.” All “Bicycle Paths” are actually shared with pedestrians, in-line skaters, etc.
Bicycle Route ^¾	Any combination of paths, lanes, trails or streets which are designated for bicycle travel by mapping or signing as a preferential travel route for alternate modes, regardless of whether such facilities are designated for the exclusive use of bicycles or are to be shared with other transportation modes.
Bikeway ^¾	Any road, path, sidewalk, trail or passage which in some manner is specifically designated as being open to bicycle travel, regardless of whether such facilities are designated for the exclusive use of bicycles or are to be shared with other transportation modes.
CMAQ —	Congestion Mitigation/Air Quality Improvement Program
Cross Section —	Diagrammatic presentation of the right-of-way profile which is at right angles to the centerline at a given location.
DOT ^¾	Department of Transportation
Edge Line ^¾	A line which is used to show the outside edge of the travel lane for cars.
Grade-Separated ^¾	An underpass, bridge or overpass. Allows motorized and non-motorized modes to avoid any interaction at intersections or street crossings.
Highway ^¾	A general term denoting a public way for purposes of vehicular travel, including the entire area within the right-of-way.
Intermodal ^¾	Use of more than one mode to accomplish a trip. Such as driving to Park-N-Ride lots to catch a bus; riding bike to bus stop; walking to bus stop; driving and walking.
ISTEA ^¾	Intermodal Surface Transportation Efficiency Act of 1991
MAG ^¾	Maricopa Association of Governments
MCDOT ^¾	Maricopa County Department of Transportation
Mode of Travel ^¾	Means by which a person’s mobility is powered and accomplished. This could be feet, bicycle, car, bus, horse, plane, skates, etc.
MPO ^¾	Metropolitan Planning Organization
Multimodal ^¾	Facility which provides for shared use by several modes, such as a park-and-ride lot with both car and bicycle parking.
Multiuse Path ^¾	See “Shared Use Path.”
Multiuse Trail ^¾	See “Shared Use Trail”



MUTCD ^¾	Manual of Uniform Traffic Control Devices. A manual approved by the FHWA as a national standard for placement and selection of all traffic control devices on or adjacent to all highways open to public travel.
Off-Road Facilities	Sidewalks, shared use paths or trails, or any facility which is not an integral part of a roadway.
Pavement Marking	Painted or applied lines or legends placed on any bikeway surface for regulating, guiding or warning traffic.
Pedestrian ^¾	Any person afoot or in a wheelchair, including motorized wheelchair.
Right-of-Way ^¾	A general term denoting land, property, or interest therein, usually in a strip, acquired for or devoted to some public purpose.
Roadway ^¾	Portion of highway for vehicle use.
Rules of the Road	That portion of a motor vehicle law which contains regulations governing the operation of vehicular and pedestrian traffic.
Shared Roadway ^¾	All roads which do not have bike lanes or wide curb lanes where bicyclists and motor vehicles share the same roadway.
Shared Use Path ^¾	A paved path used exclusively by human-powered modes and separated from motor vehicles by an open space or barriers. It can be within the highway right-of-way or an independent right-of-way. Bicyclists, pedestrians, skaters, joggers and other non-motorized users will use shared use paths at the same time.
Shared Use Trail ^¾	An unpaved pathway exclusive for equestrian and human-powered modes.
Shoulder ^¾	A portion of a highway contiguous to the roadway primarily for use by pedestrians, equestrians, bicyclists, stopped vehicles and emergencies.
Shy Distance ^¾	Distance between a bikeway's edge and any fixed object capable of injuring a cyclist using the facility.
Sidewalk ^¾	The portion of a highway designed for preferential or exclusive use by pedestrians.
Sight Distance ^¾	A measurement of the cyclist's or motorist's visibility, unobstructed, along the normal path to the farthest point of the roadway surface.
TEA 21 ^¾	Transportation Equity Act for the 21 st Century.
Traffic Control Devices ^¾	Signs, signals or other fixtures, permanent or temporary, placed on or adjacent to a travelway by authority of a public body having jurisdiction to regulate, warn or guide traffic.
Traffic Volume ^¾	The number of vehicles which pass a given point in a given amount of time.
Transportation Corridor	A strip of land between two termini within which traffic, topography, environment, and other factors are evaluated for transportation purposes.
Travel Generators	Particular areas or locations which represent trip destination points of the utilitarian bicyclist; for example, libraries, schools, recreation areas and work centers.
Travelway ^¾	Any way, path, road or other travel facility used for any and all forms of transportation.
Trip Attractors ^¾	Potential trip destinations, such as schools, recreation areas, shopping areas and employment centers.
Vehicle ^¾	A device in, upon or by which any person or property is or may be transported or drawn upon a public highway, excepting devices moved by human power or used exclusively upon stationary rails or tracks (ARS 28-102.52).
Wide Curb Lane ^¾	A road constructed with extra width in the outside lane so cars and bikes can share the same lane.



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